

THE HUMAN BRAIN,  
MASTER OF OUR DESTINY.

Frederick Tilney

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# THE HUMAN BRAIN, MASTER OF OUR DESTINY

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*How We Can Bring the Undeveloped Fifty to Eighty Per Cent  
of Man's Intellect Into Fuller Play*

By FREDERICK TILNEY

**L**ET US GRANT that up to this time we have employed the full power of our intelligence and made the best use of that marvelous organ of our bodies, the brain. Even granting this, there may be actual doubts concerning further progress. On the other hand, many reasons justify the belief that we have developed but a small fraction of our potential brain power.

When, however, we consider the brains of distinguished members of the white race we at once obtain the impression of striking individual superiority. The brains of many men of genius have been carefully studied. Spitzka has collected the records of a hundred such individuals, to which he has added his own studies upon six distinguished scientists. All tell the same story. These men, noted as jurists, scientists, statesmen, and historians, have with few exceptions possessed brains which in weight exceed those of the rank and file of the race.

This is true of the brain of such outstanding men as Beethoven, Cuvier, Turgenev, Daniel Webster, Lenin, Thackeray, Joseph Leidy, Edward Cope, and many others. The brain of the remarkable deaf, dumb, and blind girl, Laura Bridgman, has been carefully studied by Dr. Donaldson. It is notable that in this instance the frontal lobes, both in size and in the richness of the convolutions and fissures, were well developed. It was in this region that the brains of the distinguished contributors to human progress already mentioned showed their greatest degree of expansion. Recently reports on the brains of Sir William Osler, of Dr. G. Stanley Hall, and of Dr. E. E. Southward have been published. In each of these remarkable men the size of the brain and the unusual development of the frontal lobe have been striking features. The brain of the great German historian, Theodor Mommsen, was particularly notable because of its frontal development, and so also was that of Robert Wilhelm Bunsen, the scientist and discoverer.

## *Brain of Anatole France*

In contrast to the massive brains of these other men of genius, there has recently been brought to light the fact that the brain of a great modern master of literature, Anatole France, was remarkably small, weighing only 1,017 grams. This weight is considerably below the average for the white race and not much above the estimated weight of *Pithecanthropus erectus*, the Javan ape man. The difference between the weight of Anatole France's brain and that of the ape man is 77 grams, according to the estimated

values. Sir Arthur Keith maintains that in spite of this noted academician's reputation, known the world over for his writings as a novelist, philosopher, and savant, Anatole France was actually an extremely primitive man. The position taken by Keith would be difficult to support against the prevailing opinions of the day. We should be more impressed by the degree of richness in development of the frontal lobe and the complexity of its convolutions and fissures than by the actual size of the brain.

## *Caucasian Leaders*

Yet most of the great men who have left records in respect to their cerebral endowment confirm Sir Arthur's contention that a powerful brain is a large brain. Individual variation may account for much, however, and a high grade of frontal convolution, implying as it does a great cell richness, may make amends for many ounces of weight deficiency. From the facts available it is clear that human greatness in the main depends upon largeness of brain and extensive frontal development. The possessors of such brains have been the leaders in the activities of the white man, in every line of his progress, in every detail of his success. They have been the Caucasian thinkers, the idealists, the philosophers, the poets and artists; they have been the white man's pragmatists, his statesmen and builders of empire. They have also been his spiritual pioneers, the founders of his religions and ethics. To them has been given exceptional power of vision, with equally great capacities for transforming what such vision reveals into lasting benefits for their race.

History gives them their proper places. Their dynamic personalities have touched the earth and made it bring forth its seven wonders and an increasing multitude of lesser wonders, each a marvel of human ingenuity. As they touched the earth and made it produce, so they touched the hearts and imaginations of their fellow men until their minds responded to new aspirations and nobler purposes, until the mark of the beast was left farther in the distance and the ascendancy of mankind became the most stirring theme of creation.

History also shows how these favored elements of the race, under the guidance of their leaders, have built brilliant civilizations, compelling systems of religion, far-reaching codes of ethics. Nations have risen, articulating the ideals of peoples scattered over vast territories. Cities have come into existence filled with the treasures of man's imagination. The same



fact that out of some 78,000 interim check payments mailed to growers on a single day only seven were found to be in error.

What will be the ultimate success of the Pool is as yet undetermined. A majority of western farmers believes in it. At the end of the first five-year contract period a larger acreage signed up, and now over 60 per cent is under contract. In the fall of 1929 an agitation sprang up in Saskatchewan to make compulsory the delivery of all wheat to the Pool. Opinion was divided, and among those opposed was the president, A. J. McPhail, who said that the greatest strength of the Pool lay in the voluntary allegiance of its members.

At the moment of writing the Pool faces its greatest test of strength. With an apparent world surplus of wheat, it has refused to sell its grain at the European buyer's price. As a result, storage facilities are plugged and little grain has moved to the seaboard for export. Rail and lake transport have suffered appreciable losses in revenue. But the farmers have received their first cash payment, and the reserves of the Pool are strong enough to allow it to wait for its price.

Whether it succeeds in getting this price depends entirely on the extent of the crops now growing in the Southern Hemisphere. The pool has approximately

nine months in which to sell the grain it now holds in storage. If, during those months, there is a world shortage the Canadian wheat farmer wins; if there is a surplus he may or may not lose. In either case his position will be better through the existence of the Pool.

The market has undoubtedly been stabilized by the policy of selling into a bull market and withholding sales from a bear market. With the elimination of the middleman the huge profits that used to go to the private trader are now going back to the farmer. The profits through operating elevator facilities are also returned to him, and because he has financed his elevators himself, something over \$1,200,000 in interest is saved to him annually.

Accompanying the economic gains have come less tangible but quite as valuable gains of another sort. The pool farmer is no longer a farmer in the old, pitiful sense of the word. He has become a manufacturer, reasonably in control of the marketing of his own products, as is any other business man. He has proved himself as capable as an organizer, financier, manager, and executive as any other class on earth. In an age when the Big Executive is a god the farmer has learned that he can be as godlike as any.



EWING GALLOWAY

*The last word in modern wheat-field devices is the tractor-drawn combine, shown harvesting the 1929 crop. This machine cuts and threshes in a sixteen-foot swath. The Pool has helped to spread the gospel of up-to-date farm implements.*



aspiration shone through them all. It was the spirit, the determination to reach out where man had never reached before.

Whatever were his material successes, still more important was that inner possession which came to man during his adventurous development of civilization. However simple it may have been in the beginning, it grew rapidly. This priceless possession was the human intellect. In many tribes of men it manifested none of the expansion discernible in the more progressive races. But with its fullest opportunity, especially under the conditions of European environment, it developed to the degree which created a new humanity. Man recognized his interdependence with his fellow beings. His social qualities now began to bear fruit in a new soil and in a more invigorating atmosphere. The finer traits of his social nature grew abundantly. Broader conceptions of responsibility to others, deeper understandings of sympathy, led to new products of generosity and new vocations of social devotion. All the higher sentiments found easier means of expression. These were new conceptions denied to lower animals and to the lower races of man.

Scarcely less substantial than the satisfaction derived from this deep social sentiment was the gratification obtained from the appreciation of the beauties of nature and from man's own efforts to duplicate these beauties in his art and literature. But his eyes have never contented themselves with earthly attractiveness alone. When he had possessed the earth he must still reach out in imagination to gain for himself the assurance of kingdoms beyond his present state. In all his civilized period, and even long before, man has peered acquisitively into the unknown, to create for himself a future existence or the hope of such existence.

### *Contributions of the Frontal Lobe*

This yearning for another and an immortal life has been the basis of his many religious beliefs. From this theme of religion have grown the impulses for the best of human achievements. It has not merely formed a halo about civilization, but it has reached far inward to exert control over almost every human relation. No influence has been a greater force in the ennoblement of life. No creation of the brain has been a more effective guide in directing human destiny. No incentive has sustained human hope more consistently than the solace arising from this deep source of faith.

The frontal lobe which has guaranteed such advantages to man brought him his spiritual understanding, his social attributes, and his satisfactions from art and literature. It created the means for him to gain a more adequate knowledge of the world in which he lived and of the great cosmos of which his world is but a part. The conquest of reality, the deeper appreciation of things as they are, the broad expansion of his knowledge of all things in and about him, have contributed deep satisfactions to human life. It is difficult to estimate in this day the value of all the great contributions to science. It is difficult also to state which product of man's frontal lobe—his social development, his religion, his art, his literature, or his science—has meant most to the growth of that imposing figure in which he now presents himself. No one of

these elements may justly deserve to be set above the others. Deprived of any of them, the race might have been seriously impoverished; it might never have attained that position which entitles it to be considered the supreme achievement of creation. It is little wonder that the gods man set up for himself have been anthropomorphic, cast in his own image and likeness.

### *What Price Progress?*

In later days there were reasons for the Caucasian's assurance, for his self-reliance, for his faith in his own judgment and reason. Peace and comity existed between the nations of the earth. Prosperity was within their borders. Success and progress filled every walk of life. Social order rested upon firm moral foundations. This was a human establishment upon which to depend. But ultimately this record of the white man, from the beginning of his civilized period down to the early decades of the twentieth century, brings us to a fateful midsummer day—the first of August, 1914.

Perhaps there are no good reasons for turning back to such old sores. Can any conceivable advantage come of opening again those vaults holding that which we would rather forget? With passing years memory gradually relinquishes what should be the immortal lessons of experience. The horror, the degradation, and all other outgrowths of the protective mechanisms making for better judgment, for saner living, for wiser avoidance are soon forgotten. We look and see only the whited sepulcher. The dissolution and disease, the lurking danger for the future, are concealed. Yet these are our liabilities. If we drive with our eyes closed to them, such prosperity as we have attained is destined to disintegrate.

It is the old formula over again that we see beginning to reproduce itself on that fateful August afternoon. The expansive demand for power, the will to dominate, the insatiable determination to possess, are all disdainfully snapping their fingers in disregard of the rights and peaceful pursuits of others. Sacred obligations are thrown to the winds with the crackling of a scrap of paper. There are no obligations. Lust, greed, and the dregs of human cruelty are seething in the breasts of men turned animals, are ready to speak with the tongues of every manner of ruthless torment. By armies men return to the filth of the earth, living in the mire, breathing the stench of their own corruption, inhaling the gases of sadistic invention, meeting the flame of an earthly purgatory, and inspired by the single indefatigable impulse to kill. And for what purpose? None but the old one! To grasp, to gain, to seize by force! There is no question of right or wrong. The only question is right of possession. Both those who attack and those who defend pray to the same God and pray the same prayer.

### *Leadership That Went Astray*

Here in our own days is the frontal lobe leading a great fraction of the white race, not merely into hell but to the brink of its own undoing. If it failed in this leadership it was by the narrowest margin. It has left us still gasping on the edge of the precipice into whose depths we have gazed and wondering how long ere we see them again.



Thus it is seen that, although in exceptional cases of outstanding groups and highly specialized individuals the brain may have yielded something approaching its best product, modern man's brain reverts on occasion to savagery and is still capable of leading him to the very brink of destruction. Even in cases of unusual development there are deficiencies and inequalities of development due to the circumstances of training, to the introduction of adverse influences, and to the universal lack of any generally acceptable goal of life.

### *Undeveloped Brain Power*

A cross section of any community, estimated by its high and its low intellectual attainments, indicates a striking unevenness in brain development. It also reveals a low rating in the average intellectual level. Averages of this kind obtained from nations or races disclose an aggregate of brain power far below the grade of the brain's potential capacity. Instances of individual specializations make the fractional development of the race still more evident. If, for example, Laura Bridgman, deprived as she was of sight, hearing, taste, and smell and with only a fifth of her brain areas accessible to satisfactory contacts with the world, made an adjustment to life equal to the average of such adjustments; if Helen Keller, almost equally deprived of sensory impression, is rated by many as belonging to the class of genius, then the rank and file of mankind uses but a small fraction of its potential brain power. This fraction has been variously estimated at one fifth or one half.

It seems obvious that great advantages for the extension of intelligence might arise from the utilization of the unemployed 50 to 80 per cent of human power. The large portion of the brain not used by the majority of mankind introduces the disquieting thought that the usual way of life is the easiest way. The intelligent way is laborious and fraught with many trials incident to arduous application. Brain capacity may be improved only by the pursuit of patient and continuous effort and by an unremitting submission to diligent self-discipline.

It is the avoidance of these exactions that has made the development of the brain a slow process in man. It is the general disinclination to depart from the path of least effort which has held human intelligence at its average low levels. Many factors have contributed to this attitude. Not the least among them is what may be called mixed survival. This is a provision by which not only those thoroughly equipped but those as thoroughly unfit are presumed to enjoy equal opportunity in the advantages of life. The unfit depreciate the general average. Their inclusion creates the level of mediocrity and retards the progress of the fittest.

### *Hope of Advancement*

Another fact affords hope for the further development of the unused fractions of human brain power. It is possible to demonstrate that certain structural and chemical elements in the brain develop in relation to the use made of them. This is particularly true of the insulating substance surrounding nerve fibers.

Such fibers serve the purpose of impulse conduction. Simple and complex associations alike depend upon them. It has been shown that the simplest of these fiber connections come into use early in life, while the most important connections appear at later periods. In order to be effective, the connecting fibers must be insulated. The insulating material, a complex chemical substance, makes its appearance in direct relation to the different periods of mental development. This insulating substance is least in amount at birth. It increases noticeably at the end of the first year, at about the time when speech is acquired. It shows marked additions at the seventh, tenth, and twentieth years. Thereafter it increases slowly up to the fortieth year. It also manifests the interesting phenomenon of gradual decrease in the declining years of life.

Apparently the mental development of different life periods requires differing degrees of insulation in the brain. The functional use of definite areas appears to bear a direct relation to the degree of insulation. The more areas in use, the more numerous are the insulated nerve fibers to facilitate proper operation. The child uses and needs less than does the youth; and, in general, the youth less than the adult. The development of the brain thus appears to be proportional to the use made of it. In this way human intelligence may be gauged in terms of actual brain structure.

### *Conditioning the Intellect*

In cases of low intelligence demands have been relatively small, and large fractions of brain remain undeveloped because unused. Higher grades of intelligence require more extensive development because the objectives of their application are more complex and more exacting. They are the response to the more extensive utilization of brain power.

The recognition of this relation between use and structural development of the brain clearly points the way by which human intelligence may be extended. This relation has long been understood as a biological principle. It has been practically applied in the training of muscular strength and endurance, in the sharpening of the senses, in the cultivation of the voice. Its practical application to the development of the brain as a whole has been much less assiduous. Both in principle and practice this relation of use to structure indicates possibilities for producing a better human brain. The unused fractions may accordingly find opportunity for utilization.

Still another possibility for advancement arises from more adequate systems of human training. The success with which the brain is used depends in large part upon its conditioning. Such conditioning is determined by many factors. In the broadest sense it includes the influence of physical environment from the earliest moments of life, the effects of societal habits and ideals both in the family and in the group, the impress of formal education and educational forces, and the direction imparted by differing degrees of satisfaction, health, and disease. If, for example, the objective is accommodation to arctic life, the conditioning process differs in many details from that necessary for adjustment to tropical existence. If the end sought is success according to European standards, a totally different set of conditionings is essential to this result.



Civilized nations as well as barbarous tribes may be trained through generations to the pursuits and practices of warlike aggression. The results of such conditioning were clearly demonstrated in the World War.

Ultimate adjustments are thus strongly influenced by the group, the group outlook, the time, and the place. For this reason every experience in and every contact with existence assumes high value as a conditioning factor. The entire span of life, from birth to death, becomes a period of active training which may be consciously directed. The element of chief importance in this conscious control is the recognition of the end to which the training is directed. If the highest qualities of human happiness and satisfaction are the objectives, every factor which contributes to the conditioning must be carefully estimated and properly adjusted to this end. Such certainly is not the objective under the modern cult of success.

### *The Modern Cult of Success*

The earth, which we have made a bone of contention, might to our infinite advantage become the sphere of human content. In order to determine such a change it is necessary to reëstimate and readjust every influence capable of conditioning the activities of the brain. The recognition of the uninterrupted continuity in the conditioning process and its specific requirements in relation to definite phases of development is most essential. Influences of the physical environment from the first moments after birth through all successive periods demand extensive, renewed attention. In the formation of habits and ideals, training in the home and in the group reaches down to the roots of societal life. These phases of brain conditioning are now largely matters of dogmatic tradition or confused instruction.

Our present cult of success dominates formal education. The profound, far-reaching influence of this department of life is exerted through the most effective agencies for adjustment and readjustment. Education is charged with the responsibilities of devising the most beneficial methods for conditioning the brain. It participates in deciding to what ends such conditioning shall be directed and thus occupies a position of supreme control over human behavior. Its supervision embraces and guides every period of life. Its disciplines have power to shape the character of human intelligence. Its inspirations are the hope of the future. Opportunities are even now at hand for it to overcome its traditional resistance and to open new fields for human satisfaction and contentment. Greater than the power of armies, more compelling than the military force of the entire globe, is the peaceful sway which education may exert in the satisfactory reshaping of existence.

There should be added to these possibilities of future progress the fact that man, in spite of his blemishes, delinquencies, and failures, is an aspiring and plastic animal. He is not unwilling to take the form of any mold in which he may be cast. He has been the victim of many prejudicial molds—clay in the hands of circumstance. Yet, whatever his form or deformities, he has always aspired to rise above himself. His aspirations have been sublimated in the heroes he has made to admire, in the gods he has selected for worship.

Unlike all other animals, he has had the gift of idealization, the power of projecting far ahead of himself, beyond the limits of his recognized imperfections, the ideals of what he hoped or craved to be. Even his morals and his manners are products of his aspirations. His idealizations of existence in poetry and art show how tenaciously his vision has dwelt on higher things. Recognition of his own futilities has made him aspire to a future life of purification and redemption.

### *Man's Conquest of Himself*

Yet in aspiring he manifests a lingering childhood which reveals his still plastic state. The hereafter which he has designed for himself is based on an infantile system of rewards and penalties. This eventual refuge is an acquisitive immortality, born of self-interest and bred in self-conceit. It bears the taint of ancient and sordid motives of the race. It has none of the altruism of that more noble and practical immortality through which earthly life strives unselfishly to leave a worthy influence for the benefit of those who later follow the path of human experience.

In the light of his possibilities man's further progress seems assured. Add to these possibilities his remarkable plasticity, his aspiring spirit, his youthful racial development, and it appears inconceivable that he should not advance. Science is constantly placing increased power at his command. While disclosing to him his place in nature, it is also revealing what still remains to be accomplished in the conquest of himself.

Whatever fault may be found with the technique of human living, the major complaint is directed against the persistence of the old objectives. Ancient motives and standards are obstacles in the path of progress. A less complex life is needed, one with new incentives and different goals. Many are living and have lived this kind of life. One among these, the Great Galilean, has made it exemplary. As its influence comes down through the Christian centuries this life brings increasing conviction that it is the best yet lived. One third of the globe's population professes to follow it. As followers they are frustrated in their purpose by the persistence of more ancient influences of the past. Yet it cannot be denied that any order of humanity higher than the present one requires extensive modifications in our purposes, our desires, our outlook on life, our manner of self-expression.

### *A New Golden Age?*

A long step in this direction will be taken when the ancient password of the Stone Age—*get*, which for thousands of years has been the mainspring of existence—is gradually subordinated by *give*, the keynote of a new Golden Age.

This solution of the problem is likely to seem utopian. Long ago we were admonished to try it. If we have failed, we need not altogether despair. The human brain has overcome other difficulties to which it has been applied. With its possibilities for improvement, it may in time solve the supremely difficult problem of human nature. Success such as this depends largely upon the further development of science, and especially that comprehensive science which will reveal the principles underlying the behavior of man.



# WHITE COAL FOR RAILWAYS IN FRANCE

By ARTHUR TRAIN, JR.

**F**RANCE has a long uphill pull before prosperity can be definitely established, and electric locomotives are going to make the grade. For in France the same lines that carry power to the railroads carry it also into the farms and factories; and the French program of railroad electrification is bound up with the electrification of the entire country and with all the possibilities for industrial organization and expansion that are covered by the magic word "superpower."

Few know that some time before Mr. Hoover became President his constructive ability along certain lines attracted marked attention in France.

In Paris, in the winter of 1926, Maurice Mollard, senator from Savoy, made a speech on the electrification of France. He spoke of the work that Hoover was doing in the organization of the distribution of energy in the United States as exemplified in the creation of the Northeastern Superpower Committee.

## *André Tardieu*

He told them how Hoover had described the industrial revolution caused by the use of electrical energy in the United States. He did not say that Hoover was the inventor of intensified electrical development—no one man could be responsible for that—but he showed how Hoover had had the grasp to realize the significance of the tremendous change that was to take place in American industry; to realize also the importance of facilitating, organizing, and controlling that change; and to discover or create ways in which this could best be accomplished. Monsieur Mollard called the change "the Hoover revolution."

Probably the most wide-awake man in France at the time was André Tardieu, who was shortly to become minister of public works. Journalists on both sides of the water are fond of pointing out that the present premier's ideas and temperament are very American. During the war he visited the United States, liked and was liked by Americans, and was careful to note every American idea or point of view that might later be useful to himself or to his country. With a fine broadmindedness he admired Americans

for their capacity for action and because they, knowing what they wanted, wanted it with all their might. When he came back he never forgot to keep his eye on what they were doing and how they did it.

This was the man who became minister of public works shortly after Senator Mollard had coined his phrase. To say that it fell on fertile ground would not be doing justice to M. Tardieu's own acumen and originality. He devoted himself with all his well-known

drive to applying to France the methods that Mr. Hoover had applied in the United States. Through the controlled development of hydraulic resources and the distribution of energy, the country's industrial and economic system was to be transformed. There was to be a Hoover revolution in France.

## *Superpower*

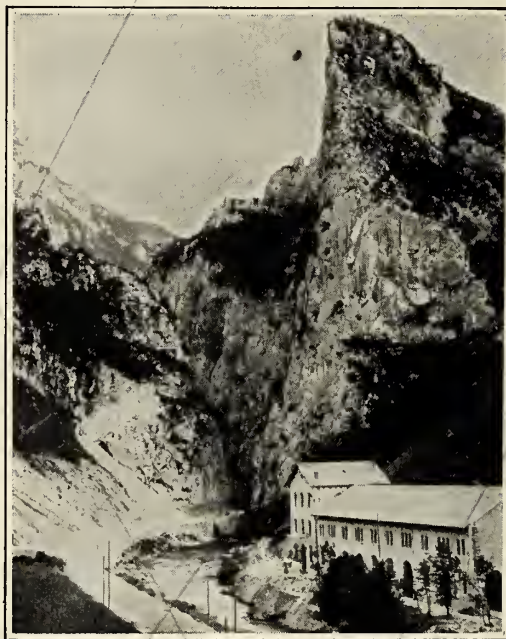
It must not be inferred that Tardieu was the first to think of electrification in France any more than Hoover was the first to think of it in the United States. On the contrary, as early as 1917, when hostilities were in full force, a commission was appointed to study power distribution. How little they understood the true significance of the problem is shown by the fact that by 1923 France was

consuming twice as many kilowatts as the commission had expected her to be using by 1935.

Aside from the financial difficulties through which the country was passing, the mentality of the people was against the rapid development of electrification. The peasant or the bourgeois would not believe it if you told him that by paying out of his pocket for electrification now he would be appreciably richer in ten years.

The railroad man is delighted to electrify his road, provided he doesn't pay more in interest on the money borrowed to cover his installation than he used to pay for operating expenses, which are, of course, much higher in steam traction. Usually it is only the constructive statesman who has sufficient perspective to realize the advantages that will accrue to the individual and the nation in the long run.

Why is electrification of such importance to France? Because she is poor in coal and rich in water power; because power is cheaper to transport than coal;



*Hydroelectric plant of St. Georges in the Pyrenees. Lakes and waterfalls make this an ideal country for electrification.*



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THE HUMAN BRAIN, MASTER OF  
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